

S U M M A R Y

Fish eggs and larvae provide a relatively untapped source of biological material for further progress in the advancing fields of fish culture and fisheries research. There has been hardly any work on developmental biology of a fish species in India. Common carp, Cyprinus carpio (Linnaeus) was found to be ideal for the study of developmental biology. Induced breeding and artificial fertilization of C. carpio was resorted to obtain and study the levels of key metabolites, enzymes, inorganic ions and effect of some cations in the different embryonic stages.

Utilization of free amino acids and proteins for energy requirements was found to be mainly at

two stages, soon after fertilization and just before hatching, while protein synthesis was predominant specially at closing of blastopore stage. Carbohydrate (glycogen) provided relatively little energy and seemed to be the main energy source only for a brief period soon after gastrulation. Lipids were found to be the major energy source throughout the prehatching stages. Depletion in the levels of total lipids soon after fertilization, accompanied with steep decline of phospholipids, strongly suggested the importance of phospholipids both in energy metabolism as well as in the assembly of cell membranes at cleavage. Activities of nonspecific phosphomonoesterases were also found higher at these stages. Study on acetylcholinesterase activity revealed that acetylcholine-cholinesterase system, besides its importance in neurotransmission, is evolved for specific purposes in the different stages of embryonic development. Increased acetylcholinesterase activity, at gastrulation and closing of blastopore stages, suggested its involvement in movement of cells during gastrulation. Role of Ca^{++} in the egg activation process, gelation of cytoplasm and ATPase activation was found obvious by the observed increase in its level soon after fertilization. Most interesting observation, however, was the very low concentration of both Na^+ and K^+ at

closing of blastopore stage. Large scale efflux of Na^+ and K^+ by active transport to maintain the ionic balance was visualized. Increased concentrations of Ca^{++} in the external medium seemed to have advantageous effect (in spite of recovery of 3 abnormal four-eyed mutant embryos at more than 100 ppm concentration). K^+ , on the other hand, was found conducive to most normal development in tap water concentration and had deleterious effects on the developing eggs of Cyprinus carpio specially at concentrations above 50 ppm.